



# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL - Accredited Laboratory as per ISO / IEC-17025 :2005**



Job No.: CTCE/BBMP/W.No.11/BBU/CSR-04/019b/CEMENT/2016-17

Date: 22.04.2016

## TEST REPORT ON CEMENT

|                    |   |                                                                                                                                                    |
|--------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------|
| * CUSTOMER         | : | Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.                                                                            |
| *AGENCY            | : | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                         |
| *NAME OF THE WORK  | : | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyaranyapura Sub Division, BBMP, Bangalore. |
| *REFERENCE         | : | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                   |
| SAMPLE ID          | : | Cement                                                                                                                                             |
| SAMPLE RECEIVED ON | : | 21.04.2016                                                                                                                                         |
| PERIOD OF TESTING  | : | 21.04.2016 to 22.04.2016                                                                                                                           |



The results of the tests conducted on the cement sample are as follows:

| Sl. No | Descriptions                     | Test Method as per IS           | Test Result | Requirements as per IS: 8112-2013 |
|--------|----------------------------------|---------------------------------|-------------|-----------------------------------|
| 1      | Standard Consistency             | IS-4031 (Part -4) 1988(RA-2009) | 29.50 %     | -                                 |
| 2      | a) Initial Setting Time          | IS-4031 (Part -5) 1988(RA-2009) | 165 Minutes | Not Less than 30 Minutes          |
|        | b) Final Setting Time            | IS-4031 (Part -5) 1988(RA-2009) | 495 Minutes | Not More than 600 Minutes         |
| 3      | Soundness by Le Chartlier Method | IS-4031 (Part-3) 1988(RA-2009)  | 1 mm        | Not more than 10mm                |

\*Information is furnished by the Customer/Representative.

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- ⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.
- ⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

\*\*\*\*\*

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Job No.: CTCE/BBMP/W.No.11/BBU/CSR-04/019b/SAND-Gradation/2016-17

: 22.04.2016

## TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

\* Customer : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.  
\* Agency : Mr. B.B. Umesh,  
#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.  
\* Name of Work : Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads  
Ward No. 11 (Kuvempunagara), Vidyaranyapura Sub Division, BBMP,  
Bangalore.  
Reference : EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016  
Technical Reference : IS : 2386 Part 1 - 1963 RA-2007  
Sample ID : Fine Aggregates  
Sample Received on : 21.04.2016  
Date of Testing : 22.04.2016



Total Wt. of Aggregates in gms 1000

| Is Sieve Size in mm | Cumulative Weight Passing in % | Specific Limits as per IS 383-1970 (RA- 2007) |         |          |         |
|---------------------|--------------------------------|-----------------------------------------------|---------|----------|---------|
|                     |                                | Zone-I                                        | Zone-II | Zone-III | Zone-IV |
| 10                  | 100                            | 100                                           | 100     | 100      | 100     |
| 4.75                | 94.20                          | 90-100                                        | 90-100  | 90-100   | 95-100  |
| 2.36                | 76.90                          | 60-95                                         | 75-100  | 85-100   | 95-100  |
| 1.18                | 57.90                          | 30-70                                         | 55-90   | 75-100   | 90-100  |
| 600 Micron          | 29.70                          | 15-34                                         | 35-59   | 60-79    | 80-100  |
| 300 Micron          | 12.20                          | 5-20                                          | 8-30    | 12-40    | 15-50   |
| 150 Micron          | 2.40                           | 0-10                                          | 0-10    | 0-10     | 0-15    |

\* Information is furnished by the Customer/Representative

Remarks : This sample is under Zone-I specific limits.

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Job No.: CTCE/BBMP/W.No.11/BBU/WMM/Gradation/2016-17

25.04.2016

## GRADATION FOR WMM MORTH TABLE-400-11

**Customer** : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : Mr. B.B. Umesh,  
#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.

**Name of Work** : Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11  
(Kuvempunagara), Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016

**Date of Testing** : 25.04.2016

**Material** : WMM

**Sample Location** : WMM Mix Plant

Oven Dry Wt (gm): 8538



| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---------------------|----------------------|---------------------------------|--------------------------|-------------------------|-------------|
| 53                  | 0                    | 0                               | 0                        | 100                     | 100         |
| 45                  | 230                  | 230                             | 2.7                      | 97.3                    | 95-100      |
| 22.4                | 2659                 | 2889                            | 33.8                     | 66.2                    | 60-80       |
| 11.2                | 1326                 | 4215                            | 49.4                     | 50.6                    | 40-60       |
| 4.75                | 1212                 | 5427                            | 63.6                     | 36.4                    | 25-40       |
| 2.36                | 995                  | 6422                            | 75.2                     | 24.8                    | 15-30       |
| 0.600               | 934                  | 7356                            | 86.2                     | 13.8                    | 8-22        |
| 0.075               | 982                  | 8338                            | 97.7                     | 2.3                     | 0-8         |

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Job No.: CTCE/BBMP/W.No.11/BBU/WMM/Gradation/2016-17

26.04.2016

## GRADATION FOR WMM MORTH TABLE-400-11

**Customer** : Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.

**Agency** : Mr. B.B. Umesh,  
#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.

**Name of Work** : Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11  
(Kuvempunagara), Vidyanarayapura Sub Division, BBMP, Bangalore.

**Reference** : EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016

**Date of Testing** : 26.04.2016

**Material** : WMM

**Sample Location** : WMM Mix Plant

Oven Dry Wt (gm): 8549



| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---------------------|----------------------|---------------------------------|--------------------------|-------------------------|-------------|
| 53                  | 0                    | 0                               | 0                        | 100                     | 100         |
| 45                  | 235                  | 235                             | 2.7                      | 97.3                    | 95-100      |
| 22.4                | 2662                 | 2897                            | 33.9                     | 66.1                    | 60-80       |
| 11.2                | 1319                 | 4216                            | 49.3                     | 50.7                    | 40-60       |
| 4.75                | 1218                 | 5434                            | 63.6                     | 36.4                    | 25-40       |
| 2.36                | 991                  | 6425                            | 75.2                     | 24.8                    | 15-30       |
| 0.600               | 942                  | 7367                            | 86.2                     | 13.8                    | 8-22        |
| 0.075               | 982                  | 8349                            | 97.7                     | 2.3                     | 0-8         |

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Job No.: CTCE/BBMP/W.No.11/BBU/WMM/Gradation/2016-17



29.04.2016

## GRADATION FOR WMM MORTH TABLE-400-11

**Customer** : Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.

**Agency** : Mr. B.B. Umesh,  
#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.

**Name of Work** : Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11  
(Kuvempunagara), Vidyananyapura Sub Division, BBMP, Bangalore.

**Reference** : EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016

**Date of Testing** : 29.04.2016

**Material** : WMM

**Sample Location** : WMM Mix Plant

**Oven Dry Wt (gm):** 8551

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---------------------|----------------------|---------------------------------|--------------------------|-------------------------|-------------|
| 53                  | 0                    | 0                               | 0                        | 100                     | 100         |
| 45                  | 241                  | 241                             | 2.8                      | 97.2                    | 95-100      |
| 22.4                | 2658                 | 2899                            | 33.9                     | 66.1                    | 60-80       |
| 11.2                | 1329                 | 4228                            | 49.4                     | 50.6                    | 40-60       |
| 4.75                | 1232                 | 5460                            | 63.9                     | 36.1                    | 25-40       |
| 2.36                | 982                  | 6442                            | 75.3                     | 24.7                    | 15-30       |
| 0.600               | 931                  | 7373                            | 86.2                     | 13.8                    | 8-22        |
| 0.075               | 978                  | 8351                            | 97.7                     | 2.3                     | 0-8         |

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30.04.2016

## GRADATION FOR WMM MORTH TABLE-400-11

**Customer** : Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.  
**Agency** : Mr. B.B. Umesh,  
#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.  
**Name of Work** : Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11  
(Kuvempunagara), Vidyananyapura Sub Division, BBMP, Bangalore.  
**Reference** : EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016

Date of Testing : 30.04.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 8622

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---------------------|----------------------|---------------------------------|--------------------------|-------------------------|-------------|
| 53                  | 0                    | 0                               | 0                        | 100                     | 100         |
| 45                  | 271                  | 271                             | 3.1                      | 96.9                    | 95-100      |
| 22.4                | 2673                 | 2944                            | 34.1                     | 65.9                    | 60-80       |
| 11.2                | 1329                 | 4273                            | 49.6                     | 50.4                    | 40-60       |
| 4.75                | 1232                 | 5505                            | 63.8                     | 36.2                    | 25-40       |
| 2.36                | 987                  | 6492                            | 75.3                     | 24.7                    | 15-30       |
| 0.600               | 952                  | 7444                            | 86.3                     | 13.7                    | 8-22        |
| 0.075               | 978                  | 8422                            | 97.7                     | 2.3                     | 0-8         |

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Job No.: CTCE/BBMP/W.No.11/BBU/WMM/AIV/2016-17

25.04.2016

## Aggregate Impact Value

IS: 2386 Part IV

|                   |                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.                                                                                  |
| Agency            | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                               |
| Name of the Work  | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads<br>Ward No. 11 (Kuvempunagara), Vidyaranyapura Sub Division, BBMP,<br>Bangalore. |
| Reference         | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                         |
| Source / Location | WMM Plant                                                                                                                                                |
| Type of Mix       | Wet Mix macadam                                                                                                                                          |
| Date of Testing   | 25.04.2016                                                                                                                                               |



| Sl No. | Details                                                                    | Trial No. |       | Average |
|--------|----------------------------------------------------------------------------|-----------|-------|---------|
|        |                                                                            | 1         | 2     |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 378       | 375   | 20.45   |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 76        | 78    |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 355       | 363   |         |
| 4      | Aggregate Impact value = percent fines                                     | 20.11     | 20.80 |         |
|        | $100 * (W_2/W_1) \%$                                                       |           |       |         |

### Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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AE-11  
OAB

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Job No.: CTCE/BBMP/W.No.11/BBU/WMM/S-1/2016-17

25.04.2016

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

|                     |                                                                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Customer            | Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.                                                                    |
| Agency              | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                 |
| Name of Work        | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads<br>Ward No. 11 (Kuvempunagara), Vidyaranyapura Sub Division, BBMP, |
| Reference           | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                           |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011)                                                                                                             |
| Type of Mix         | Wet Mix Macadam                                                                                                                            |
| Date of Testing     | 25.04.2016                                                                                                                                 |



Result : Flakiness Index = 11.23%

Elongation Index = 13.56%

Result : Combined Flakiness & Elongation index 24.79%

### Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Bit/2016-17

18.05.2016

## BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-11-1984

|                  |                                                                                                                                                     |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| CLIENT           | Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.                                                                            |
| AGENCY           | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                          |
| NAME OF THE WORK | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyanarayapura Sub Division, BBMP, Bangalore. |
| REFERENCE        | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                    |
| SAMPLE I/D       | Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11                                                                                  |
| DATE OF TESTING  | 18.05.2016                                                                                                                                          |

### BITUMEN CONTENT DETERMINATION

| Description                                          | Trail 1 | Trail 2 |
|------------------------------------------------------|---------|---------|
| 1. Weight of Mixture before Test, g                  | 500     | 500     |
| 2. Weight of Mixture after Test, g                   | 475     | 474     |
| 3. Weight of Asphalt and Mineral matter Extracted, g | -       | -       |
| 4. Weight of Mineral Matter, g.                      | -       | -       |
| 5. Weight of Ash, g                                  |         |         |
| 6. Weight of Bitumen Extracted, g. (corrected)       | 25      | 26.00   |
| 7. Bitumen content in %                              | 5.00    | 5.20    |
| 8. Average                                           | 5.10    |         |

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Handwritten signature in green ink.

**M/s. Civil-Tech Consultants & Engineers**

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Bit/2016-17

18.05.2016

## BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

|                  |                                                                                                                                                    |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| CLIENT           | Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.                                                                            |
| AGENCY           | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                         |
| NAME OF THE WORK | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyananyapura Sub Division, BBMP, Bangalore. |
| REFERENCE        | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                   |
| SAMPLE I/D       | Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11                                                                                 |
| DATE OF TESTING  | 18.05.2016                                                                                                                                         |



### GRADATION AFTER EXTRACTION

| Sieve Size in mm | Trail 1             |            |                       |           | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|------------------|---------------------|------------|-----------------------|-----------|----------------------------------------------------------------------|
|                  | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing |                                                                      |
| 13.2             | 0                   | 0          | 0                     | 100       | 100                                                                  |
| 9.5              | 37.56               | 7.91       | 7.91                  | 92.09     | 90-100                                                               |
| 4.75             | 261.56              | 55.07      | 62.97                 | 37.03     | 35-51                                                                |
| 2.36             | 55.49               | 11.68      | 74.65                 | 25.35     | 24-39                                                                |
| 1.18             | 42.56               | 8.96       | 83.61                 | 16.39     | 15-30                                                                |
| 0.3              | 26.46               | 5.57       | 89.19                 | 10.81     | 9-19                                                                 |
| 0.075            | 28.49               | 6.00       | 95.18                 | 4.82      | 3-8                                                                  |

| Sieve Size in mm | Trail 2             |            |                       |           | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|------------------|---------------------|------------|-----------------------|-----------|----------------------------------------------------------------------|
|                  | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing |                                                                      |
| 13.2             | 0                   | 0          | 0                     | 100       | 100                                                                  |
| 9.5              | 31.46               | 6.64       | 6.64                  | 93.36     | 90-100                                                               |
| 4.75             | 251.47              | 53.05      | 59.69                 | 40.31     | 35-51                                                                |
| 2.36             | 59.46               | 12.54      | 72.23                 | 27.77     | 24-39                                                                |
| 1.18             | 38.49               | 8.12       | 80.35                 | 19.65     | 15-30                                                                |
| 0.3              | 32.46               | 6.85       | 87.20                 | 12.80     | 9-19                                                                 |
| 0.075            | 40.59               | 8.56       | 95.77                 | 4.23      | 3-8                                                                  |

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Bit/2016-17

19.05.2016

## BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-11-1984

|                  |                                                                                                                                                    |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| CLIENT           | Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.                                                                            |
| AGENCY           | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalsur Village & (P), Bangalore-57.                                                          |
| NAME OF THE WORK | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE        | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                   |
| SAMPLE I/D       | Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11                                                                                 |
| DATE OF TESTING  | 19.05.2016                                                                                                                                         |

### BITUMEN CONTENT DETERMINATION

| Description                                          | Trail 1 | Trail 2 |
|------------------------------------------------------|---------|---------|
| 1. Weight of Mixture before Test, g                  | 500     | 500     |
| 2. Weight of Mixture after Test, g                   | 475     | 474.2   |
| 3. Weight of Asphalt and Mineral matter Extracted, g | -       | -       |
| 4. Weight of Mineral Matter, g.                      | -       | -       |
| 5. Weight of Ash, g                                  |         |         |
| 6. Weight of Bitumen Extracted, g. (corrected)       | 25      | 25.80   |
| 7. Bitumen content in %                              | 5.00    | 5.16    |
| 8. Average                                           | 5.08    |         |

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Bit/2016-17

19.05.2016

## BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

|                  |                                                                                                                                                    |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| CLIENT           | Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.                                                                            |
| AGENCY           | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                         |
| NAME OF THE WORK | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyananyapura Sub Division, BBMP, Bangalore. |
| REFERENCE        | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                   |
| SAMPLE I/D       | Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11                                                                                 |
| DATE OF TESTING  | 19.05.2016                                                                                                                                         |

### GRADATION AFTER EXTRACTION

| Sieve Size in mm | Trail 1             |            |                       |           | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|------------------|---------------------|------------|-----------------------|-----------|----------------------------------------------------------------------|
|                  | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing |                                                                      |
| 13.2             | 0                   | 0          | 0                     | 100       | 100                                                                  |
| 9.5              | 36.47               | 7.68       | 7.68                  | 92.32     | 90-100                                                               |
| 4.75             | 263.48              | 55.47      | 63.15                 | 36.85     | 35-51                                                                |
| 2.36             | 53.46               | 11.25      | 74.40                 | 25.60     | 24-39                                                                |
| 1.18             | 40.356              | 8.50       | 82.90                 | 17.10     | 15-30                                                                |
| 0.3              | 29.46               | 6.20       | 89.10                 | 10.90     | 9-19                                                                 |
| 0.075            | 26.48               | 5.57       | 94.67                 | 5.33      | 3-8                                                                  |

| Sieve Size in mm | Trail 2             |            |                       |           | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|------------------|---------------------|------------|-----------------------|-----------|----------------------------------------------------------------------|
|                  | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing |                                                                      |
| 13.2             | 0                   | 0          | 0                     | 100       | 100                                                                  |
| 9.5              | 30.46               | 6.42       | 6.42                  | 93.58     | 90-100                                                               |
| 4.75             | 250.49              | 52.82      | 59.25                 | 40.75     | 35-51                                                                |
| 2.36             | 60.51               | 12.76      | 72.01                 | 27.99     | 24-39                                                                |
| 1.18             | 34.56               | 7.29       | 79.30                 | 20.70     | 15-30                                                                |
| 0.3              | 32.49               | 6.85       | 86.15                 | 13.85     | 9-19                                                                 |
| 0.075            | 40.78               | 8.60       | 94.75                 | 5.25      | 3-8                                                                  |

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/AIV/2016-17

18.05.2016

## Aggregate Impact Value

IS: 2386 Part IV

|                   |                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.                                                                            |
| Agency            | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                          |
| Name of the Work  | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyanarayapura Sub Division, BBMP, Bangalore. |
| Reference         | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                    |
| Source / Location | Hot Mix Plant, Bangalore                                                                                                                            |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                                                                      |
| Date of Testing   | 18.05.2016                                                                                                                                          |



| Sl No. | Details                                                                    | Trial No. |       | Average |
|--------|----------------------------------------------------------------------------|-----------|-------|---------|
|        |                                                                            | 1         | 2     |         |
| 1      | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 384       | 385   | 20.29   |
| 2      | Weight of aggregate passing 2.36 mm sieve after the test = $W_2$ g         | 76        | 80    |         |
| 3      | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g        | 302       | 304   |         |
| 4      | Aggregate Impact value = percent fines<br>$100 * (W_2/W_1) \%$             | 19.79     | 20.78 |         |

### Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Shape\_T/2016-17

: 18.05.2016

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

|                     |                                                                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Customer            | : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.                                                                               |
| Agency              | : Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                            |
| Name of Work        | : Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads<br>Ward No. 11 (Kuvempunagara), Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference           | : EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                      |
| Technical Reference | : IS 2386(Part 1) 1963 (RA 2007)                                                                                                                        |
| Type of Mix         | : Semi Dense Bituminous Concrete                                                                                                                        |
| Date of Testing     | : 18.05.2016                                                                                                                                            |



Result : Flakiness Index = 12.23%

Elongation Index = 13.11%

Result : Combined Flakiness & Elongation index 25.34%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Stripping/2016-17

18.05.2016

## Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

|                  |                                                                                                                                                          |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Customer         | Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.                                                                                  |
| Agency           | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                               |
| Name of the work | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads<br>Ward No. 11 (Kuvempunagara), Vidyananyapura Sub Division, BBMP,<br>Bangalore. |
| Reference        | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                         |
| Type of Mix      | Semi Dense Bituminous Concrete                                                                                                                           |
| Date of Testing  | 18.05.2016                                                                                                                                               |



Type of binder : 80/100  
Percentage of binder used : 5.0% by wt.  
Total weight of aggregate : 200 g  
Total weight of binder : 10.0 g  
Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|--------------------|-----------------------|---------------------|-----------------------------|
| 1                  | 3.0                   | 3.13                | 96.87                       |
| 2                  | 3.1                   |                     |                             |
| 3                  | 3.3                   |                     |                             |



### Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Sp\_Wa/2016-17

18.05.2016

## Specific Gravity And Water Absorption Test

IS: 2386 Part III

|                   |                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Customer          | Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.                                                                            |
| Agency            | Mr. B.B. Umesh,<br>#385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore-57.                                                          |
| Name of the Work  | Improvements and Asphaltting to Ashraya Layout Main Road an Cross Roads Ward No. 11 (Kuvempunagara), Vidyanarayapura Sub Division, BBMP, Bangalore. |
| Reference         | EE/BTP/BBMP/E-PMT/221/2015-16 Dated : 16.02.2016                                                                                                    |
| Type of Mix       | Semi Dense Bituminous Concrete                                                                                                                      |
| Source / Location | Hotmix Plant, Bangalore                                                                                                                             |
| Date of Testing   | 18.05.2016                                                                                                                                          |



| Sl. No. | Details                                                | Notation                    | Test Number |        |        | Mean Value |
|---------|--------------------------------------------------------|-----------------------------|-------------|--------|--------|------------|
|         |                                                        |                             | Test 1      | Test 2 | Test 3 |            |
| 1       | Weight of aggregate suspended in water with the basket | $W_1$ g                     | 2010        | 2008   | 2006   |            |
| 2       | Weight of basket suspended in water                    | $W_2$ g                     | 755         | 755    | 755    |            |
| 3       | Weight of saturated aggregate in water                 | $(W_1 - W_2) = W_s$ g       | 1255        | 1253   | 1251   |            |
| 4       | Weight of saturated surface dry aggregate in air       | $W_3$ g                     | 2016        | 2013   | 2019   |            |
| 5       | Weight of water equal to the volume of the aggregate   | $(W_3 - W_s)$ g             | 761         | 760    | 768    |            |
| 6       | Weight of oven dried aggregate                         | $W_4$ g                     | 2005        | 2003   | 2006   |            |
| 7       | Specific Gravity                                       | $W_4 / (W_3 - W_s)$         | 2.635       | 2.636  | 2.612  | 2.627      |
| 8       | Apparent Specific gravity                              | $W_4 / (W_4 - W_s)$         | 2.673       | 2.671  | 2.657  | 2.667      |
| 9       | Water Absorption                                       | $((W_3 - W_4) * 100) / W_4$ | 0.55%       | 0.50%  | 0.65%  | 0.57%      |

### Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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